

5 WHAT IS CLAIMED IS:

1. An electrode for attachment to a subject during a defibrillation procedure, comprising:

a conductive member having an outer surface; and

10 a therapeutic agent disposed in surface contact with a subject undergoing the defibrillation procedure and in electrical contact with the conductive member, whereby transport of the therapeutic agent to the subject is enhanced by application of electrical energy  
15 to the conductive member.

2. An electrode according to claim 1, wherein the therapeutic agent is selected from the group consisting of epinephrine, adenosine, bretylium,  
20 atropine sulfate and lidocaine.

3. An electrode according to claim 1, further comprising a gel layer covering at least a portion of the outer surface of the conductor, wherein the  
25 therapeutic agent is disposed in the gel layer.

5           4.    An electrode according to claim 1, wherein  
the conductive member receives electrical energy at a  
level sufficient to induce at least one of  
electroporation and electromotion.

10           5.    An electrode for attachment to a subject  
during a defibrillation procedure, comprising:  
          a first conductive member having an outer surface;  
          a second conductive member having an outer surface  
and being electrically isolated from the first  
15   conductive member;  
          means for connecting the first conductive member  
to the subject;  
          means for connecting the second conductive member  
to the subject; and  
20           a therapeutic agent in surface contact with the  
subject undergoing a defibrillation procedure and in  
electrical contact with the second conductive member,  
whereby transport of the therapeutic agent is enhanced  
by application of electrical energy to the second  
25   electrode.

5           6.    An electrode according to claim 5, wherein  
the first and second conductive members are carried by  
a single non-conductive substrate.

          7.    An electrode according to claim 6, wherein  
10   the first and second conductive members are  
substantially coplanar.

          8.    An electrode according to claim 5, wherein  
the therapeutic agent is a drug selected from the group  
15   consisting of epinephrine and lidocaine.

          9.    An electrode according to claim 5, wherein  
the means for attaching the first and second conductive  
members includes, respectively, first and second gel  
20   layers which are electrically conductive, each having  
an inner surface connected respectively to the first  
and second conductive members.

          10.   An electrode according to claim 5, wherein  
25   the second conductive member receives electrical energy

5 at a level sufficient to induce at least one of  
electroporation and electromotion.

11. A defibrillation apparatus, comprising:  
a power supply;  
10 a control circuit connected to the power supply;  
first and second electrodes electrically  
connectable to the power supply through the control  
circuit, and being connectable to a subject undergoing  
a defibrillation operation; and  
15 a therapeutic agent in electrical contact with at  
least one of the first and second electrodes, the at  
least one electrode being electrically powered at a  
level sufficient to enhance transport of the  
therapeutic agent to the subject.

20

12. A defibrillation apparatus according to claim  
11, wherein each electrode includes a conductive member  
having first and second opposite side surfaces, and a  
non-conductive backing connected to the first surface  
25 of the conductive member.

5           13. An defibrillation apparatus according to  
claim 11, wherein the first and second electrodes  
includes a gel layer, and therapeutic agent is carried  
by the gel layer of at least one of the electrodes.

10           14. A defibrillation apparatus according to claim  
11, wherein the first and second conductive member  
receive electrical energy at a level sufficient to  
induce at least one of electroporation and  
electromotion.

15           15. A defibrillation apparatus according to claim  
11, wherein the therapeutic agent is a drug selected  
from the group consisting of epinephrine and lidocaine.

20           16. A defibrillation apparatus according to claim  
12, wherein the therapeutic agent is carried by an  
electrically conductive gel layer connected to one of  
the first and second conductive members.

25           17. A defibrillation apparatus according to claim  
11, wherein the power supply delivers a voltage to the

5 first and second electrodes in a range of about 30 to  
2,500 volts for a time between about 0.5 milliseconds  
and 5 seconds, the voltage being sufficient to impart  
transdermal delivery of the drug and to deliver a  
defibrillation shock to the patient.

10

18. A defibrillation apparatus according to claim  
11, wherein the power supply delivers a voltage to the  
electrodes in a range of about 0 to 40 volts for a time  
between about 0.1 seconds and 30 minutes, the voltage  
15 being sufficient to enhance the transdermal delivery of  
the drug via electromotive force.

19. A method of treating a patient comprising the  
steps of:

20 placing at least two electrodes in surface contact  
with a subject;

placing a therapeutic agent in surface contact  
with the subject and in electrical contact with at  
least one of the two electrodes;

25 electrically connecting the at least two  
electrodes to a voltage source;

5           supplying a voltage to the subject through the at  
least two electrodes for a time and at a level  
sufficient to enhance transdermal delivery of the  
therapeutic agent to the subject.

10           20. A method according to claim 18 wherein the  
therapeutic agent includes an active agent selected  
from the group consisting of lidocaine and epinephrine.

21. A method according to claim 18, wherein the  
15 step of supplying a voltage comprises supplying a  
voltage in a range of about 0 to 50 volts for a time  
between about 0.12 seconds and 30 minutes.

22. A method according to claim 18, wherein  
20 before supplying a voltage through the two electrodes,  
supplying a voltage in a range of about 30 to 2,500  
volts for a time between about 0.5 milliseconds and 5  
seconds, said voltage being sufficient to impart a  
defibrillation shock.

25

23. A defibrillation apparatus comprising:

5           a base unit including a power supply;  
          a first defibrillation electrode connectable to  
the power supply;  
          a second defibrillation electrode connectable to  
the power supply;  
10          a drug delivery electrode connectable to the power  
supply; and  
          a control circuit for selectively connecting the  
power supply to the first, second and third electrodes  
to deliver electric energy at a level sufficient to  
15 defibrillate a subject and to impart transdermal  
delivery of a drug to the subject.

24. A defibrillation apparatus according to claim  
23, wherein the power supply includes a first power  
20 supply connected between the first and second  
defibrillation electrodes, and a second power supply  
connected between one of the first and second  
defibrillation electrodes and the drug delivery  
electrode.

25